

Abstract

In this study, the production of weight ratio of 1% multi-walled carbon nanotubes (MWCNT) reinforced / unreinforced Polymethyl Methacrylate (PMMA) nanofiber mats was carried out by electrospinning. PMMA concentration of 10, 12.5 and 15% weight in Dimethylformamide (DMF) solvent used in order to reach optimized electrospinning conditions. PMMA solutions with higher concentration ratio leading to higher viscosity and conductivity properties eliminates defects and imperfections and results improved quality of the products. In addition, different feed rates of 0.25, 0.50 and 0.75 ml/hour with 10 kV applied voltage power were compared for given MWCNT reinforced PMMA solutions electrospinning at specified concentration rate of solution were analyzed. Higher feed rates result thicker nanofiber diameters. Furthermore, Scanning Electron Microscope (SEM) images were investigated to determine the morphological properties of PMMA with MWCNT nanofibers and the average diameter of nanofibers. Optimum production parameters for 15 % wt. ratio and 0.5 ml/hr feed rate for electrospinning of PMMA-MWCNT solution were determined after comparison of results of alternative production options. We produced high quality bead-free nanofibers during electrospinning of PMMA fibers with MWCNT by manipulating dispersion methods, composition rates and electrospinning conditions. Thermal analysis of nanofibers was done by using Differential Thermal Analysis (DTA) and Thermogravimetric Analysis (TGA) in order to obtain Glass Transition Temperature (T_g), Melting Temperature (T_m) and Decomposition Temperatures (T_d) with respect to mass loss.